

What Is Claimed Is

1. A ultrasound puncture system comprising:
 - a handpiece which accommodates an ultrasound vibrator as ultrasound wave generating means;
 - a puncturing probe for transmitting ultrasound waves to a biological wall which is to be punctured;
 - an outer cover tube which covers the probe and is detachably attached to the handpiece;
 - an ultrasound power source unit for supplying energy for driving the ultrasound vibrator;
 - termination means installed in the ultrasound power source unit for terminating the energy supply to the ultrasound vibrator; and
 - impedance detection means installed in the ultrasound power source unit for detecting the puncture state when the probe punctures the biological wall, wherein the penetration of the probe through the biological wall is detected with the impedance detection means and the supply of energy to the ultrasound vibrator is terminated by the detection output.
2. The ultrasound puncture system according to claim 1, wherein

there is a space open from the base end portion of the probe to the distal end portion of the probe between the outer cover tube and the probe;

the ultrasound power source unit comprises fluid supply means for supplying a fluid to the space; and

the penetration of the probe through the biological wall is detected with the impedance detection means and the supply of energy to the ultrasound vibrator is terminated by the detection output.

3. The ultrasound puncture system according to claim 1, further comprising:

electric current detection means for detecting the electric current component of the energy supplied to the ultrasound vibrator;

voltage detection means for detecting the voltage component of the energy;

operation means for deriving the impedance from the detection results of the electric current and voltage detection means;

decision means for deciding that the probe has penetrated the biological wall based on the results of the operation means.

4. The ultrasound puncture system according to claim 3, wherein

each of the electric current detection means and the voltage detection means is provided with an A/D converter for converting the detection results into digital data.

5. The ultrasound puncture system according to claim 1, wherein

a first electrode and a second electrode are provided in the ultrasound power source unit;

one of the electrodes is connected to so as provide for electric conductivity to the probe; and

the system further comprises discrimination means for converting the impedance between the electrodes and judging the results detected with the impedance detection means.

6. The ultrasound puncture system according to claim 5, wherein

the outer cover tube is composed of a non-conductive member and a conductive member;

the non-conductive member is disposed on the inner surface of the outer cover tube, which is in contact with the probe; and

the second electrode is electrically connected to the conductive member of the outer cover tube.

7. The ultrasound puncture system according to claim 1, wherein

means for supplying the energy to the ultrasound vibrator and fluid supply means for supplying a fluid into the space between the outer cover tube and the probe are separate units;

each of those units comprises communication means for causing them to operate in response to each other; and

fluid supply means supplies the fluid to the vibrator via the communication means in response to the energy supply.

8. The ultrasound puncture system according to claim 1, wherein

a sheath is further disposed between the probe and the outer cover tube, and means is provided for causing the distal end of the sheath to protrude forward beyond the distal end portion of the probe in response to an output of

the impedance detection means that detected that the distal end portion of the probe has penetrated through the biological wall.

9. An ultrasound puncture system comprising:

a handpiece which accommodates an ultrasound vibrator as ultrasound wave generating means;

a puncturing probe for transmitting ultrasound waves to a biological wall which is to be punctured;

an outer cover tube which covers the probe and is attached to the handpiece;

an ultrasound power source unit for supplying energy for driving the ultrasound vibrator;

termination means installed in the ultrasound power source unit for terminating the energy supply to the ultrasound vibrator;

impedance detection means installed in the ultrasound power source unit for detecting by the impedance the puncture state when the probe punctures the biological wall; and

fluid supply means installed in the ultrasound power source unit for supplying a fluid to the distal end opening of the outer cover tube and the probe, wherein

the penetration of the probe through the biological wall is detected with the impedance detection means and the supply of energy to the ultrasound vibrator is terminated by the detection output.

10. An ultrasound puncture system comprising:

a handpiece which accommodates an ultrasound vibrator as ultrasound wave generating means;

a puncturing probe for transmitting ultrasound waves to a biological wall which is to be punctured;

an outer cover tube which covers the probe and is attached to the handpiece;

an ultrasound power source unit for supplying energy for driving the ultrasound vibrator;

termination means installed in the ultrasound power source unit for terminating the energy supply to the ultrasound vibrator;

impedance detection means installed in the ultrasound power source unit for detecting the impedance of the distal end portion of the probe and an electrode disposed on the biological wall which is to be punctured with the distal end portion of the probe; wherein

the penetration of the probe through the biological wall is detected with the impedance detection

means and the supply of energy to the ultrasound vibrator is terminated by the detection output.